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ABSTRACT

The kindergarten Learning to Learn Program was designed to help children acquire flexible strategies for dealing with challenges and problems. The pupils in both experimental and control groups were from a low income black neighborhood. The program was organized around a carefully planned sequence of language and mathematical games and game-like activities; special teaching methods guaranteed success to each child. Through a sequence of planned experiences, the curriculum allowed children to move from motor manipulation to the building of perceptual imagery to symbolic experiences through the medium of interesting and challenging games and game-like activities. Teachers and teacher aides were trained in an intensive in-service training program to become child-oriented rather than content-oriented. Flexibility in grouping and parent participation were important factors. Sequence charts for language and mathematical games along with related activities are included. Results of the Stanford-Binet Form L-M, Peabody Picture Vocabulary Test, and the Illinois Test of Psycholinguistic Abilities are given. Charts show comparative gains of experimental and control groups. (KG)

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LEARNING TO LEARN PROGRAM

Jacksonville, Florida

Preschool Program in Compensatory Education 1

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JACKSONVILLE, FLORIDA

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FOREWORD

This project report is part of an independent study of selected exemplary programs for the education of disadvantaged children completed by the American Institutes for Research in the Behavioral Sciences, Palo Alto, Calif., under contract with the U.S. Office of Education.

The researchers report this project significantly improved the educational attainment of the disadvantaged children involved. Other communities, in reviewing the educational needs of the disadvantaged youngsters they serve, may wish to use this project as a model - adapting it to their specific requirements and resources.

Bureau of Elementary and Secondary
Education

LEARNING TO LEARN PROGRAM
JACKSONVILLE, FLORIDA

Introduction

The emphasis in the Learning to Learn Program was on helping children learn to learn, that is, to acquire flexible strategies for dealing with challenges and problems. There was a corresponding de-emphasis on acquiring factual content or knowledge. The program was organized around a carefully planned sequence of games and game-like activities which take into account the child's level of cognitive development and make maximal use of his abilities and interests. Special teaching methods, geared to the open-ended feature of these activities, guaranteed success to each child, regardless of his ability. The program took into account various developmental and learning principles from psychology.

Children in the experimental and control groups were drawn from two virtually all-Negro communities on the south side of Jacksonville, Florida. Although both of these communities are near the downtown area, nearly all the dilapidated, hastily built houses are situated on undeveloped and completely unimproved land. Matching on socioeconomic level and cultural background was accomplished by selecting 72 five-year-old Negro children from homes with annual family incomes below $3000. None of the parents were employed at an occupational level above unskilled laborer. To control for intelligence and school readiness skills, the three groups were matched on scores obtained on the Stanford-Binet Intelligence Scale and a school readiness screening test developed and standardized by the program director.

The children were divided into three groups of 24, with about the same number of boys and girls in each group. The experimental group was exposed to the Learning to Learn treatment for 9 months, from September 1965 to May 1966. One of the control groups was exposed to a "traditional" kindergarten program which consisted of group activities designed to expose the children to a wide range of stimulation, concepts, and ideas, but was not based on the developmental sequential program, nor was it designed to teach these children how to learn. This "traditional" control group attended a church-run kindergarten. (As of the 1968-69 school year, Florida public elementary schools begin with first grade.) The second control group consisted of children who remained at home throughout the year and were not exposed to any formal "preschool" training, that is, did not attend a private kindergarten. Performance of the Learning to Learn group was compared to the two control groups on a variety of developmental measures. Results of these tests showed that the experimental group made much greater gains than the controls on all of these measures and that the differences were large enough to be of practical as well as statistical significance. A follow-up study with measures taken in the public school system at the end of the first grade indicated that children in the experimental group were still significantly superior to the other two groups on nearly all

of the developmental measures. The long-term effects of the experimental program were most evident in measures of intellectual functioning on which traditionally trained children and children without preschool experience remained much below the experimental group.

Personnel

A. Program Director

The director, who donated his full-time services to the program, held a PhD. For several years he served as staff psychologist at a school for emotionally disturbed and mentally retarded children, where his responsibilities included diagnostic testing, therapy, and research. Besides managing the Learning to Learn Program, training and supervising the program's instructional staff, and developing the special games and materials used with the Learning to Learn children, the program director assumed the duties of bus driver in order to transport the two dozen experimental children (none of whom lived within walking distance) to and from school.

B. Program Evaluators

The evaluation of the Learning to Learn Program was performed by an independent evaluation team from the University of Florida. Both members of the evaluation team held PhD degrees. One was Assistant Professor of Clinical Psychology and the other Assistant Professor of Psychology at the university.

C. Teacher

A qualified teacher with a master's degree in education and 4 years' experience in grades K through 3, the Learning to Learn teacher donated her full-time services to the program. She planned and organized daily lessons and participated in continuous in-service training and daily staff planning sessions.

D. Teacher Aide

The salaried, full-time teacher aide, a Negro, was recommended to the program director by one of the parents. Without prior teacher training or teaching experience, she nevertheless responded very well to the Learning to Learn in-service training and was adept at working with the children when they needed help or wanted to talk to an adult. The teacher aide also helped in daily planning and organization of instructional activities.

E. Testing Personnel

Four qualified examiners were trained in administration procedures for the individual testing sessions. Two of these individuals held PhD degrees. The others had extensive experience in diagnostic testing and some experience in therapy; all testing personnel (two men and two women) also scored tests.

The program also employed a full-time secretary, a full-time maid (who also prepared the daily snack), and, for a while, a bus driver.

Methodology: General

The Learning to Learn Program was organized around certain basic principles of mental growth and child development. One assumption was that development of the child's ability to think, reason, and learn follows an orderly sequence of growth with periods of transition. Based on past child-development research, it was further assumed that this sequence proceeds from motor, to perceptual, to symbolic levels. Additional principles of mental growth and child development which were basic to the program may be paraphrased as follows:

> Learning is an active, on-going process that occurs when material the child uses possesses certain properties: (a) it must be appealing and attractive enough to arouse the child's curiosity; (b) it must make the child feel reasonably sure of what he is doing; (c) and it must direct the child to a goal and at the same time give him some feedback concerning where he is with respect to the goal.
>
> The methods employed to teach the young child must be flexible, play-oriented, and be adaptable to different developmental and learning levels [Sprigle, in Van De Riet & Van De Riet, Appendix A, 1966].

The Learning to Learn curriculum, materials, classroom physical arrangements, and orientation of teachers were structured on all of these theories.

The curriculum, materials, and method. The uniqueness of the Learning to Learn curriculum lay in the introduction of entirely new techniques, approaches, and materials which require the child to manipulate, explore, and experiment. Through a sequence of carefully planned experiences, the curriculum moved from motor manipulation to the building of perceptual imagery to symbolic experiences through the medium of interesting and challenging games and game-like activities. The activities were designed to progress from low to high in motor-perceptual-symbolic skills and also to move across these dimensions in sequential fashion [Sprigle, in Van De Riet & Van De Riet, Appendix A, 1966]. For example, the games were constructed around five content areas (clothing, food, animals, furniture, transportation). These five areas were chosen because examples of content are familiar to children of all socioeconomic backgrounds, and because they are readily available as real or miniature three-dimensional objects. Each of the five areas was sequenced in such a way that each was revisited and repeated in a variety of ways. Each time, however, the game or activity moved one step beyond the real and the concrete toward the abstract. The real orange, for example, was replaced by a picture of an orange as the only stimulus, and finally, the games were highly verbal and required statements about an orange. Every game or activity engaged the child in some kind of interplay of

manipulation, perception, and verbalization. Games at the beginning of a sequence emphasized development of motor and perceptual-imagery skills and processes, and minimized the necessity for verbal communication. Games at the end of the sequence were predominantly verbal and stressed the understanding and use of language, auditory discrimination, and concept formation [Sprigle, et al., 1968]. All new materials and approaches were field-tested to determine clarity of instructions, motivation, and interest, before being incorporated into the Learning to Learn curriculum.

Through intensive in-service training the Learning to Learn teacher (and her teacher aide) became child- rather than content-oriented. (The nature of this training is described under In-service Activities.) Their roles were carefully defined to reflect the premise that each child has a drive for maturity and increased competence and mastery over his environment. The major purpose of the teacher and her aide was to support the child's efforts in this regard, and to create and maintain an environment where each child could develop independence, responsibility, self-confidence, and respect for himself and others. For example, children were protected by certain rules from intruders who might harm them, or disrupt or destroy. However, the teacher's observation of and sensitivity to each child was such that, in general, she could anticipate problems before they started. She knew when a child was about to get himself in trouble. She knew his tolerance for frustration. She knew when an activity group was potentially explosive. Typically, the teacher would unobtrusively guide potential troublemakers into other activities where their special interests and abilities would be highlighted. The teacher's techniques in introducing the various games and activities were also supportive, yet geared to (again, unobtrusively) arranging contingencies in such a way that the child could not fail. For example, in a game in which a child was asked to identify a capital letter which the teacher held up, he might not be able to name the letter, but maybe he could respond that it was "red," or that it was "bigger" than another letter the teacher held up. All of the games were open-ended, permitting the teacher a great deal of flexibility in adjusting the demands made on a child to his individual capabilities.

Physical arrangement, scheduling, and grouping. The program required two classroom areas. One was a work-play area large enough to accommodate 24 children who could engage in a variety of activities without competing for space or materials. A smaller room set apart from this work-play area was used for small-group work with more structured learning activities. (The second room could be an adjoining hallway or other small space, the only requirement being that it should be as free as possible from visual and auditory distractions.)

This kind of physical arrangement allowed for both homogeneous and heterogeneous grouping of children. It provided a large area in which all children could work and play together in activities which they defined and structured (about 90 minutes). From this general area, groups of from two to four children of the same developmental level were taken in turn to the small room to engage in planned learning activities (about 10 to 20 minutes per group). The adult-pupil ratios in each room, the grouping arrangements, the nature of the work-play activities, and the approximate time blocks for each major type of activity are shown in Figure 1.

ALL ACTIVITIES TAKE PLACE IN THE LARGE ROOM, EXCEPT SMALL-GROUP SESSIONS

FREE ACTIVITY
Adult-Pupil Ratio: 1:about 20
Grouping: Heterogeneous
Materials: Learning to Learn games and activities[1] from past small-group sessions; blocks; tape-recorded stories; electric typewriters; two-way radios writing, drawing, and printing materials; educational toys, books, miscellaneous (from home)

SMALL-GROUP SESSIONS (in small room)
Adult-Pupil Ratio: 1:2, 3, or 4
Grouping: Homogeneous
Materials: Learning to Learn games and activities[1]

CLEANUP

SNACK

STORY (or Music/Rhythm)
Adult-Pupil Ratio: 2:24
Grouping: Heterogeneous
Materials: Books, tape recorder, taped stories, records, simple rhythm equipment

RELATED ACTIVITIES
Adult-Pupil Ratio: 1:10
Grouping: Heterogeneous, 2 groups of 5 boys & 5 girls each.
Materials: Varies with activity, which is related to that day's small-group work

90 minutes[2] | 15 min. | 15 min. | 30-45 minutes | Remainder

[1](See "E. Key aids and materials," p. 2.)
[2](Time units fluctuate to suit day-to-day requirements.)

Fig. 1. Typical day's schedule at the Learning to Learn School.

Use of the small-room work area and small homogeneous groups facilitated the control of extraneous stimulation. The room was nearly barren except for the learning materials for that particular small-group session. The child's attention was drawn to the materials and the teacher. The floor, rather than tables and chairs, was the work space. This appeared to be a more comfortable arrangement because the children had comparatively greater freedom of movement.

Continuous regrouping permitted a child to work on one level with one kind of material (e.g., a number game) and at another level with another kind of material (e.g., a language game). It was felt that such flexibility prevented children from stereotyping each other and helped each child see that he was better in some things than in others. Whatever his level, he was assured of success. Each child was exposed to the new game or activity at his own pace. Some children needed time to overcome self-doubt and become oriented before tackling a game. The teacher accepted the child's decision and behavior in these cases, as long as he did not engage in solitary activity that would distract the other children. The teacher did not give information in a direct, formal way, but rather listened and observed, and encouraged the children to look and think about the materials and to talk over their observations and discoveries. The teacher was a <u>member</u> of the group, entering the discussion <u>only</u> to clarify what a child might say, to correct distortions, to question a statement by asking the group its opinion, or to relate a statement to experiences others might have had which were inconsistent with what the speaker said. During these discussion periods, and after a child had made a decision or given an answer, he was asked to relate "what had gone on in his brain" (i.e., to recognize, organize, and make public this internal process). If a child had difficulty expressing the process he used to solve a problem, the teacher guided him (through subtle inquiry) to clarify it. The other children in the group were expected to show respect for the speaker by being quiet so that he could think, by giving him a chance to solve the problem or meet the challenge himself. Development of a positive self-concept was felt to be enhanced in this way, the assumption being that it is ego building for a child to know he has the attention of the group, that his ideas are as important as those of other speakers. The child was encouraged to listen to himself as he spoke in order to evaluate his own thoughts and feelings. The games and activities used in these small-group sessions were gradually moved out to the large room. Here, they were available for use during the free-activity period, and children defined and structured their use of these materials to suit themselves.

At the end of the 90-minute free-activity period in the large room (coinciding with the end of the 10- to 20-minute small-group sessions), there was a general cleanup (about 15 minutes) in preparation for a snack (about 15 minutes) and story- or music-and-rhythm time (about 30 to 45 minutes). In keeping with the philosophy that learning is an on-going, active process, the stories, and the curiosity and interest they aroused, were not confined to "story-time." Children were encouraged to relate the experience through media of their own choosing. One child might draw a picture, while another might reconstruct the story with blocks. All

books were accessible to children on a loan basis, and parents were encouraged to read to children each night. Remaining time (the total classtime was 3 hours) was devoted to large-group activities (half of the class in each group) based on that day's small-group work. For example, if small-group work had emphasized numbers, the children might be asked to draw a set of objects that represented a specific number.

In both classroom areas, then, the child had the opportunity to struggle with and master difficulties in his own unique way at his own pace. It was felt that the child learned to become more independent as he learned how to master new situations. He "learned to learn" to think, to reason, and to develop self-confidence and self-esteem through more effective and efficient copying behavior, be it of a social, personal, or academic nature [Sprigle, in Van De Riet & Van De Riet, Appendix A, 1966].

Parent participation. Another important component of the program was the participation of both the father and mother of each child in monthly discussion groups. Held on Sunday afternoons, these meetings were very well attended. (The program director made telephone calls to parents not present 15 minutes before these meetings and nearly always got a 100% turnout.) Parents were divided into two groups small enough to encourage active participation.

At the initial meeting parents were asked two questions:

1. How can we help your child this school year?

2. What help would you like to get from these discussion groups?

Their answers were used as a basis for the content of future meetings. Parents were encouraged to ask questions and to talk about their children's lives outside of school.

It was estimated parents talked at least 80% of the time. The program director, the teacher, and the teacher aide described exactly what they did in class. In addition, videotapes of classroom activities (both in the large and small rooms) were shown regularly at these meetings. The program director filmed these activities himself twice a week, so that any one of at least eight current videotapes might be used to stimulate discussion. The videotapes were shown to parents so that they could see the connection between what was actually happening to their chilren and the objectives they (the parents) had articulated at the initial parent-staff group meeting in answer to the two questions noted above. A typical parent reaction to the videotaped class sessions was to remark (often with some surprise) that his child was learning. Parents were particularly impressed with the "patience" of the teacher in allowing their child to proceed at his own pace. In fact, a frequently observed reaction was that parents squirmed uncomfortably while their child was taking the time he needed to work out his own way of responding to the learning situation. In this way, the videotapes subtly set up the Learning to Learn approach as a model parents could emulate in their at-home interactions with the child. Finally, activities were suggested which the child could do at

home and share the following day with the class. For example, a child with the help of a parent might go through newspapers and magazines cutting out "mommies and daddies," and bring his cuttings to class for discussion with the other children.

In addition to these monthly meetings, individual teacher/parent conferences were scheduled in January and June. During these conferences, parents and teachers would share what each knew about the child, his behavior at home and at school. The parents were given the chance first to speak in a conference. Teachers did not try to interpret or analyze what went on at home, but did use the parents' comments to lead into problems with the child in the classroom. (Invariably the same behavior was occurring in both places.) The discussion proceeded without parents being on the defensive, possibly because <u>they</u> were the ones who first mentioned their child's problems, not the teacher.

This approach of listening to parents, sharing experiences in and out of the classroom, and showing and explaining the program was consistent with the staff's approach with their children. Repeatedly, parents were told that their child would succeed, that the program staff believed in him, that they (the parents) were helping the program do its job. When a child was showing progress, the staff emphasized that this indicated his parents had helped bring this about and should get the credit--that they could and they <u>were</u> succeeding. Over the series of parent meetings and conferences, it became obvious to the staff that parents grew to trust them and have confidence in themselves, just as their children did.

<u>Staff planning and in-service training</u>. Each day, as soon as the 3-hour class was over and the children had been driven home, the director, the teacher, and the aide met to discuss the day's activities, special problems and individual progress of pupils and to plan the next day's activities. The most current videotape was viewed, and the director critiqued the lesson as part of the staff's daily in-service training. The critique served to articulate what really happened in the classroom with the objectives of the Learning to Learn Program. Where the videotape revealed inconsistencies between practice and theory, modifications in procedures were discussed, and the teacher and aide adjusted the next day's plan accordingly.

<u>Videotapes</u>. The use of the videotape for staff planning, in-service training, and parent education has been discussed above. Videotapes are given a special heading here to emphasize that they were a key component of the Learning to Learn Program and therefore are considered essential to any replication of the program.

<u>Key aids and materials</u>. The most critical materials were the language and math games and activities which helped to give the curriculum its unique character. Published by Science Research Associates, these are now provided in two kits. Each kit consists of a detailed Teacher's Manual and the items necessary for each of the sequenced curriculum activities. As described earlier, the materials were required for <u>all</u> of the small-group work. In addition, the same materials eventually became available to the entire

class during the free-activity period. In addition to these special language and math materials, the following aids and materials were used: electric typewriters (e.g., for spelling exercises during free-activity time); tape recorders with earphones (e.g., for listening to stories and for recording the children's stories); blocks, writing, drawing, and painting equipment (including felt-tip markers, pencils, crayons, chalks, paints); phonograph records (e.g., for music-rhythm activities); and children's books (e.g., for story-time and home use).

Methodology: Specific

A. Language and Communication

The language-oriented games and related activities were designed to develop the child's abilities to perceive, recognize, categorize, and discover relationships. Games and activities were sequenced to gradually develop and extend the child's ability to talk about and deal with things and ideas in the abstract, or in the absence of any tangible objects or relationships. Language became a tool for thinking, reasoning, and communicating things that the child had not said or heard before. The games went beyond the teaching of language and communication skills. The child also was given opportunities for the development of strategies of gathering information, problem-solving, and decision-making. Table 1 shows the sequence of games and related activities.

B. Number and Space

The sequenced set of math-oriented games and related activities sought to develop abilities such as observation, classification, comparison decision-making, problem-solving, and organization of information. The games were designed not to teach mathematics but to develop the child's ability to discover relationships that he must be aware of to understand certain mathematical concepts. The games and activities were sequenced to follow each child's developmental pattern as he moved from elementary insight to sophisticated comprehension of basic mathematical concepts [Sprigle, 1967]. Table 2 shows the sequence (pp. 16 to 18).

Evaluation

A. Measures of Achievement

Phase I (5-year-olds, end of treatment)

The performance of the three groups was compared by means of a simple analysis of variance for each of the developmental test measures applied. As claims for cognitive benefits of the Learning to Learn Program are based mainly on performance on the Stanford-Binet Form L-M, Peabody Picture Vocabulary Test, and the Illinois Test of Psycholinguistic Abilities, only results on these measures are given here. The analysis of variance showed $p < .001$ for F values in each case. Following Bartlett's test, t tests were applied to determine the significance of the differences in mean scores for the groups (Table 3, p. 19).

TABLE 1

Sequence Chart for Language Games and Related Activities

GAMES AND ACTIVITIES	OBJECTIVES
Human Body:	
Activities (There are 7 activities constructed around parts of the body.)	The activities are sequenced so that the child first develops awareness of his body by learning the names and functions of the parts of the body. Objectives of these first activities also include providing experience in observing and applying information, and developing the ability to verbalize observations and experiences. The remaining activities review and reinforce knowledge of the names and functions of parts of the body, and provide experience in describing, in applying knowledge, in organizing information and material, and in relating an object to a picture of the object.
Face Game **Boy Game**	Both games are designed to develop abilities to make decisions based on previous experience and to verbalize reasoning. In addition the games provide experiences in organizing parts of a whole and in associating an object with a picture of an object.
Related Activities (There are 4 of these activities.)	In general, these related activities review or reinforce the knowledge of the names, placement, and functions of parts of the body. One of the activities emphasizes the use of previous experiences to solve problems.
Clothing:	
Activity 1 -- The Clothing Family	To introduce the names and functions of various articles of clothing; to provide experience in grouping things by a common trait.
Activity 2 -- Paper Dolls	To review names and functions of various items of clothing; to provide experience in associating an object with a picture of the object.
Clothing Game	To provide experience in organizing information to accomplish a goal; to develop the ability to make decisions using knowledge gained from previous experiences; to provide experience in organizing parts into a whole.

TABLE 1 (cont.)

Sequence Chart for Language Games and Related Activities

GAMES AND ACTIVITIES	OBJECTIVES
Properties (concluded):	
Activity 4 -- Shape	To develop an awareness of "round," "curved," and "straight"; to develop the ability to use the senses of sight and touch to gain knowledge.
Activity 5 -- Color	To give suggestions for teaching color.
Activity 6, 7, 8, and 9 -- Describing Objects	Activities 6 and 7 provide experience in comparing objects through the senses of sight and touch. All four activities provide experiences in applying knowledge to identify and describe objects.
Related Activities (There are 8 of these activities.)	The related activities review concepts developed in Activities 1, 2, 3, and 4.
Food:	
Activity 1 -- Fruits	To introduce fruits; to provide experience in gathering information by using the senses of sight and touch; to provide experience in applying knowledge.
Activity 2 -- Guess the Fruit	To review fruits; to provide experience in applying knowledge of size, shape, and texture.
Activity 3 -- Guess the Fruit (Smell and Taste)	To extend knowledge of fruits; to provide experience in using the senses of smell and taste to gather information.
Activity 4 -- Vegetables Activity 5 -- Guess the Vegetable Activity 6 -- Guess the Vegetable (Smell and Taste)	The objectives for these three activities follow the same pattern as objectives for Activities 1, 2, and 3, above.

TABLE 1 (cont.)

Sequence Chart for Language Games and Related Activities

GAMES AND ACTIVITIES	OBJECTIVES
Activity 3 -- Pictures of Clothing	To review the names and functions of various clothing items; to extend knowledge of articles of clothing.
Activity 4 -- Organizing Clothing	To develop the ability to organize information; to provide experience in applying information to solve problems.
Related Activities (There are 4 of these activities.)	The first three related activities review names of articles of clothing and provide experience in organizing information and/or in classification. The fourth activity is designed to extend knowledge of clothing.
Properties:	
Activity 1 -- Size	To develop awareness of "long," "short," "thick" ("fat"), and "thin" ("skinny"); to develop the ability to use the senses of sight and touch to gain knowledge; to develop the ability to apply more than one concept to identify an object.
Activity 2 -- Texture	To develop awareness of "rough" ("bumpy"), "smooth," "hard," "soft"; to review "long," "short," "thick" ("fat"), and "thin" ("skinny"); to develop the ability to apply more than one concept to identify an object.
Activity 3 -- Weight	To develop awareness of "heavy" and "light"; to develop the ability to use the senses of sight and touch to gain knowledge; to review "long," "short," "thick" ("fat"), "thin" ("skinny"), "smooth," "rough" ("bumpy"), "hard," "soft"; to develop the ability to apply more than one concept to identify objects.

TABLE 1 (cont.)

Sequence Chart for Language Games and Related Activities

GAMES AND ACTIVITIES	OBJECTIVES
Food (continued):	
Activity 7 -- Pictures of Fruits and Vegetables	To review fruits and vegetables; to provide experience in associating a real object with a picture of that object.
Fruit and Vegetable Game	To develop the ability to make decisions based on previous experiences; to develop the ability to verbalize reasoning; to develop the ability to organize material.
Activity 8 -- Meats	To introduce meats; to provide experience in applying knowledge; to provide experience in gathering information.
Activity 9 -- Guess the Meats	To review meats; to provide experience in applying information to identify an object.
Meat and Vegetable Game Meat and Fruit Game Meat, Fruit, and Vegetable Game	In general, the objectives for these three games follow the same pattern as objectives for the Fruit and Vegetable Game, above.
Activity 10 -- Milk Products	To introduce milk products; to extend knowledge of food items.
Activity 11 -- Bread (Grain) Products	To introduce bread products; to extend knowledge of food items.
Activity 12 -- Food Family	To introduce the food family; to provide experience in organizing information.
Activity 13 -- Organizing Food	To develop the ability to organize information; to provide experience in applying information to solve problems.
Related Activities (There are 17 of these activities.)	The first few of these related activities review and reinforce knowledge of fruits. (Related Activity 4 provides experience in using information about shape, color, and other characteristics to solve a problem.)

TABLE 1 (cont.)

Sequence Chart for Language Games and Related Activities

GAMES AND ACTIVITIES	OBJECTIVES
Food (concluded):	Related Activities 6-10 review and reinforce knowledge of vegetables, 11 and 12 review and reinforce knowledge of meats, and 13 deals with all three of these foods. Related Activities 14 and 15 review milk products and bread (grain) products, respectively, while 16 reviews and reinforces knowledge of food items, and 17 gives firsthand experience with food and its sources.
Furniture:	(Games and related activities constructed around the idea of houses as dwellings, the names and functions of rooms in a house, and the names and functions of various items of furniture in the rooms are not presented here due to limited space.)
Animals:	(Games and related activities constructed around tame and wild animals are not presented here due to limited space.)
Transportation:	(Games and related activities constructed around land, water, and air transportation are not presented here due to limited space.)
Applying Strategies and Knowledge:	
Families Game	To develop the ability to use previous experiences to make decisions; to provide experience in applying knowledge of properties and structure, using partial visual clues.
Categories Game	To develop the ability to use previous experiences to solve problems; to develop the ability to associate representative items with a whole classification.
Scramble I Game	To provide experience in organizing information; to develop the ability to make decisions by applying strategies and knowledge gained from previous experiences; to provide experience in expressing ideas.

TABLE 1 (cont.)

Sequence Chart for Language Games and Related Activities

GAMES AND ACTIVITIES	OBJECTIVES
Applying Strategies and Knowledge (concluded):	
Scramble II Game	To provide experience in organizing information; to develop the ability to make decisions applying strategies and knowledge gained from previous experiences; to develop experience in expressing ideas.
Clue Game	To develop the ability to use previous experiences to solve problems; to provide experience in verbalizing reasoning and expressing ideas.
Clue and Rhyme Game	To develop the ability to use previous experiences to solve problems; to provide experience in organizing information and materials.

[Adapted from the Sequence Chart in the Teacher's Manual for H. A. Sprigle's Inquisitive Games, Discovering How to Learn, published by Science Research Associates, 1969.]

TABLE 2

Sequence Chart for Math Games and Related Activities

GAMES AND ACTIVITIES	OBJECTIVES
Obstacle Course	To develop the child's awareness of his own body in relation to an object.
Chairs	To develop the child's ability to use kinesthetic and temporal cues in making spatial judgments.
Road Game I	To provide practice in using kinesthetic and temporal cues as an aid to spatial estimation.
Road Game II	To develop the child's ability to use visual cues and previous experience to make fine discriminations of spatial relationships (no kinesthetic cues).
Colored-Stick Activities (There are 12 of these activities.)	The activities are sequenced so that the child at first is required simply to identify colors of sticks; later, to classify them by color and size; still later, to construct a sequence by size and color: and, finally, to develop the concepts that (1) length may be composed of different parts and (2) length remains the same regardless of the arrangement of its parts. The activities sometimes require the child to manipulate the sticks in order to learn about their characteristics. Vocabulary related to sequence (first, second, third, fourth, fifth) is also taught.
Squares Game, Equivalence, Estimation I, House Game, Steps Game (These five games each are associated with lead-in and/or follow-up activities designed to review or reinforce concepts developed in the games.)	The games and related activities are sequenced to reinforce and extend the above two concepts about length--as well as to develop the concept that length is composed of shorter lengths added together, to extend the child's ability to construct a sequence according to size and color, and to provide practice in performing additive operations. For example, increasingly demanding rules for stick replacement are imposed (white sticks are used for replacement) to reinforce the concepts about length, and the child's ability to use visual cues to estimate spatial relationships also is developed to extend these concepts.

TABLE 2 (cont.)

Sequence Chart for Math Games and Related Activities

GAMES AND ACTIVITIES	OBJECTIVES
Recognizing and Writing Numerals	To develop the child's ability to recognize the numerals 1 through 9. To develop the child's ability to seriate the numerals 1 through 9. To develop the child's ability to write the numerals 1 through 9.
One to Three Game Version 1	To reinforce the child's recognition of the numerals 1 through 3.
Version 2	To develop the concept that the numerals 1, 2, 3 represent sets of objects.
Later-Play Activity	To reinforce the concept that the numerals 1, 2, 3 represent sets of objects.
One to Six Game One to Nine Game	The respective objectives of Versions 1 and 2 of these two games and the "later-play activity" for each are similar to the objectives associated with the One to Three Game above.
Plus and Minus Signs	To familiarize the children with the plus and minus signs.
Buy and Sell Games (There are two of these games, each preceded by a related lead-in activity.)	The games and their lead-in activities are designed to develop, extend, and reinforce (1) concepts of addition and subtraction, (2) the child's understanding of the record-keeping functions of numerals, and (3) his ability to classify according to family. Mathematical sentences are introduced.
Animal Toss Game Land and Water Animals Game	These two games, each preceded by a related lead-in activity, are designed to develop and extend the child's understanding of the concepts more than and less than and the terms plus, minus, and equals. Experiences are also provided in counting and in classification by family.
Theater Tickets Game (There are two of these games, each preceded by related lead-in activities.)	These games extend the concepts introduced in the lead-in activities, which are as follows: to introduce the concept of multiple-class memberships, to reinforce the concepts more than and less than, and to provide experience in performing the operations of addition and subtraction.

TABLE 2 (cont.)

Sequence Chart for Math Games and Related Activities

GAMES AND ACTIVITIES	OBJECTIVES
Estimation II Estimation III	These games extend and develop the child's ability to apply these previously learned concepts: (1) any length is composed of shorter lengths added together, (2) the terms more than and less than describe relationships, and (3) there are specific relationships between the lengths of the colored sticks. Experiences are also provided in making accurate spatial judgments and in solving problems which involve logical relationships. "Later-play activities" (in which color cues are removed) are designed to further extend the ability to make accurate spatial judgments.
The Two, Three, Four and Five Games	These four games each stress the development of insights into the nature of equivalence. "Later-play" activity is designed to determine the extent of transfer of learning from the four games.

[Adapted from the Sequence Chart in the Teacher's Manual for H. A. Sprigle's Inquisitive Games, Exploring Number and Space, published by Science Research Associates, 1967.]

TABLE 3

Comparison of First Posttest Mean Scores for Experimental and Control Groups, Learning to Learn Program

Test	Learning to Learn (Group A) mean N=24	Traditionally trained (Group B) mean N=24	No training (Group C) mean N=24	t value for A/B difference	p[2]	t value for A/C difference	p[2]
Stanford-Binet IQ	104.12	90.33	83.29	5.36	<.001	7.50	<.001
Peabody Picture Vocab.[1]	54.50	38.54	35.83	7.62	<.001	7.90	<.001
ITPA[1]							
Vocal Encoding	20.21	10.79	10.58	10.60	<.001	10.26	<.001
Visual Decoding	13.04	10.12	8.67	4.07	<.001	5.40	<.001
Auditory-Vocal Association	15.42	11.42	9.08	4.63	<.001	7.23	<.001
Visual-Motor Association	16.58	11.42	9.92	6.00	<.001	7.80	<.001

[1]Scores = number correct (or raw scores).

[2]One-tailed test.

[Source: Table 1, pp. 5-6, Van De Riet & Van De Riet, 1966.]

The t tests indicated that the program group was always significantly superior to the two control groups. Although the "traditionally" trained group out-performed the no treatment group, the differences were not nearly as great as between the program and "traditional" groups.

The practical significance of these results may be illustrated by the fact that the program group had an average IQ which was about 21 points above the no training group (which actually decreased during the year, while the "traditional" group held constant). Table 3 shows similar differences on the other measures.

Phase II (Follow-up at end of first grade)

The performance of the three groups was again compared by means of a simple analysis of variance. With the exception of the Binet Vocabulary Subtest, the resulting F values were highly significant (p usually <.001). Results of t tests are given in Table 4.

As can be seen from Tables 3 and 4, the extremely large developmental superiority which could be attributed to effects of treatment at the end of Phase I largely remained at the end of first grade, 1 year after the end of treatment. Specifically, children who had been in the Learning to Learn Program prior to entering public school (i.e., first grade) performed so much better than children without preschool experience that the difference was generally significant at the .001 level. Furthermore the Learning to Learn children also performed better than the children exposed to a traditional preschool program, with particularly large differences on measures of intellectual ability such as the WISC, Binet, and PPVT. These differences are again large enough to be of considerable practical significance. (On the other hand, follow-up comparisons between "traditional" and "no treatment" groups show that much of the difference has diminished, with no statistically significant differences remaining on some of the most important measures of intellectual functioning (WISC Verbal IQ, Binet IQ, and PPVT).

B. Other Evaluation Indices

The independent evaluation team reported that the evaluation instruments did not seem to measure all of the differences that were apparent between the program children and the children from the two control groups [Van De Riet & Van De Riet, 1967]. The evaluator's comments, based on observations of the children during the testing sessions, may be summarized as follows:

1. Program children were much more free and verbal in reacting with the examiners than were children in the two control groups. (In turn, children in the "traditionally trained" control group were more free and verbal in the testing situation than children from the "no treatment" control group.)

TABLE 4

Comparison of Second Posttest Mean Scores for Experimental and Control Groups, Learning to Learn Program

Test	Learning to Learn (Group A) mean N=21	Traditionally trained (Group B) mean N=20	No training (Group C) mean N=20	t value for A/B difference	p^2	t value for A/C difference	p^2
Stanford-Binet IQ	101.10	89.30	84.40	3.19	<.01	4.08	<.01
WISC Full Scale IQ	103.00	89.70	82.15	4.01	<.001	5.69	<.001
PPVT[1]	61.24	52.95	51.50	3.85	<.001	4.24	<.001
ITPA[1]							
Vocal Encoding	19.52	1.41	10.90	4.93	<.001	6.38	<.001
Visual Decoding	13.90	11.70	10.60	2.27	<.05	3.06	<.01
Auditory-Vocal Association	18.79	15.75	13.45	2.78	<.01	3.85	<.001
Visual-Motor Association	17.71	15.10	13.55	2.22	<.05	3.33	<.01

[1]Scores = number correct (or raw scores).

[2]One-tailed test.

[Source: Table 5, pp. 24-25, Van De Riet & Van De Riet, 1967.]

2. Although adequate rapport was established with all of the children (by acclimating them to the school setting, testing rooms, and examiners before testing was begun), the program children appeared to be more eager for the testing experiences which they found very interesting and challenging. They also had a much better capacity to ask appropriate, inquisitive questions. The children from the other two groups were much less inquisitive about the materials used in the testing and about the total testing situation. They also showed less confidence in their ability to solve problems.

Budget

The Learning to Learn Program operated in part with funds provided by the Office of Economic Opportunity (less than half of the estimated program cost) and with very large amounts of donated personnel time, equipment, specially developed materials, and miscellaneous services. It was estimated that $23,000 (including the value of donated items) was program cost. There were additional costs associated with the evaluation. These costs were incurred for data collection, statistical analyses, and report writing which were performed by an independent evaluation team from the University of Florida at Gainesville. The team included the two "program evaluators" and their testing personnel. (See Personnel.) If the program were to be repeated, the following major items would be required for each class of about 25. Starred items serve the program as a whole.

A. Personnel

*1 - Program director (full-time)
1,2 - Teacher (two would be ideal, for each class)
1 - Aide (one per class, in addition to the teachers)
*1 - Secretary
*1 - Bus Driver
*1 - Maid

B. Materials and Equipment

1 - Inquisitive games, exploring numbers and space, by H. A. Sprigle (Science Research Associates)
1 - Inquisitive games, discovering how to learn, by H. A. Sprigle (Science Research Associates)
4 - Electric typewriters
3 - Tape recorders (with earphones)
4 - Two-way telephones
* - Videotape equipment

Modifications and Suggestions

The evaluation team suggested that the important question to be answered in future follow-up is how this higher degree of test intelligence affects learning performance of children who had the Learning to Learn experience [Van De Riet & Van De Riet, 1967]. The necessary comparison could be made if the children from the original experimental and control groups were assigned to comparable first grade programs.

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For More Information

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